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STRATEGIC APPLICATION OF RAIL TO HELP BUILD A FREE AND STABLE IRAQ

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As the world watched the United States Military execute effective operations in Iraq, it also witnessed the difficult process of building a free and stable country. The purpose of this paper is to demonstrate to the strategic leadership of the Department of Defense and Department of State the value rail has in building a free and stable Iraq, and the strategic role that it plays by maximizing transportation levels to improve the Iraqi unemployment rate and raise their quality of life within the country. Maximizing rail transportation levels produces a three-fold benefit to the Iraqi people and the coalition forces by improving unemployment, raising Iraqi quality of life, and potentially reducing the insurgent problems in the country. The strategic application of rail is defined as an executive recognizing the importance of maximizing rail's capability to do more than transport cargo. Increasing a nation's employment level, raising the quality of life, settling inhospitable areas in the country, expanding populations, harvesting raw materials, and completing projects requiring massive supplies are examples of the strategic application of rail. This paper also discusses the problems of unemployment, the quality of life in Iraq, and the solution that rail offers to help build a free and stable Iraq.

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> High unemployment and continued presence of the U.S. military in and around Fallujah have made people depressed and angry. Hungry people will eat you. And people here are very hungry. [1]

<div align="right">- Fallujah's municipal officials
March 2004, after 4 US contractors were killed.</div>

The purpose of this paper is to demonstrate to the strategic leadership of the Department of Defense and Department of State the value rail has in building a free and stable Iraq, and the strategic role that it plays by maximizing transportation levels to improve the Iraqi unemployment rate and raise their quality life within the country. Through analysis of the current rail system in Iraq, this paper provides recommendations to maximize rail transportation levels to put large amounts of supplies in the hands of as many Iraqis as possible. Maximizing rail transportation levels produces a three-fold benefit to the Iraqi people and the coalition forces by improving unemployment, raising Iraqi quality of life, and potentially reducing the insurgent problems in the country. This paper uses two case studies that analyze how the strategic application of rail has increased employment, raised the quality of people's life, and accomplished seemingly impossible tasks. The strategic application of rail is defined as an executive recognizing the importance of maximizing rail's capability to do more than transport cargo. Rail can help increase a nation's employment level, raise the quality of life, settle inhospitable areas in the country, increase population, harvest raw materials, and complete projects requiring a massive amount of supplies. This paper also discusses the problems of unemployment, the quality of life in Iraq, and the solution that rail offers to help solve these issues to build a free and stable country.

Rail is sometimes viewed as an outdated mode of transportation that executives realize must be functional, but may not understand its strategic value to transport massive amounts of cargo, employ many people, and raise the quality of life for the population. The key recommendation of this paper is that Department of Defense and Department of State leaders should recognize the importance of rail in building a free and stable Iraq, emphasize its use, implement the methods of improvement recommended in this paper, and ensure it is properly resourced.

STRATEGIC IMPORTANCE OF A FREE AND STABLE IRAQ

President Bush outlined the strategic importance of a free and stable Iraq during his address to the nation at the U.S. Army War College in May 2004. During this speech, he

outlined five specific steps to achieve a free and stable Iraq. Those five steps are to transfer "a sovereign Iraqi government, help establish security, continue rebuilding Iraq's infrastructure, encourage more international support, and move toward a national election."[2] Both steps two and three in this process relate to this paper and how the strategic application of rail supports the accomplishment of these objectives. The President also related how a free and stable Iraq will help to deny terrorists a safe haven for operation, discount their ideas, and give a chance for reform to occur in the region.[3] This example will provide others in the region an opportunity to see the positive effects of freedom and deliver "a decisive blow to the heart of its power [terrorism] and a victory for the security of America and the civilized world."[4]

America's demonstrated success in Iraq has strategically affected other countries in a manner that President Bush describes. Iraq borders Syria, Iran, and Saudi Arabia and in many ways is centrally located to effect reform in the region. It is interesting to note that before our initial success in Iraq, Syria openly criticized the United States, but stopped this criticism after our military's demonstrated success. "It is hardly surprising that Syria made diplomatic overtures to the United States. . .It is in a difficult geo-strategic position. . . Syria's economy is weak and its major source of revenue - helping the Saddam Hussein beat the oil embargo on Iraq – now is gone."[5] Libya is also another country in the region that has shown reform by openly declaring that it will no longer pursue their quest for obtaining weapons of mass destruction.[6] Perpetuating this reform is a key goal in building a free and stable Iraq and the strategic application of rail provides a way to help achieve this goal.

OBSTACLES IN GETTING TO A FREE AND STABLE IRAQ

Once President Bush declared major combat operations completed, the coalition began Iraq's reconstruction and most Americans were hopeful to see a free and stable Iraq emerge quickly. However, even with Saddam Hussein gone from power and the coalition's initial military success, the world saw how difficult the reconstruction process became with insurgent attacks that took coalition lives and damaged infrastructure. Although the regime was gone and the country liberated, the unemployment rate remained high and the quality of life for the Iraqis did not immediately improve. Iraqis were unhappy, many Americans wondered why, and public support for our involvement in Iraq began to wane.

What may have been misunderstood in the reconstruction process was that economic sanctions against Iraq after the first Gulf War contributed to a significant decline in the country's gross domestic product (GDP) and negatively impacted the quality of life for Iraqis. During the nine-year period following the first Gulf War, Iraq's GDP declined 75 percent, which is a drastic

decline in the goods and services that the nation produces. [7] Iraq's once modern way of life declined and the people of the country were negatively affected.

These sanctions also negatively affected the diet of the Iraqis. Although diet may seem overly simple, hunger can play a powerful role in a person's quality of life. Because of the sanctions, Iraqis average daily "caloric intake plunged from the levels of relatively better-off Third World countries to those of the desperately poor Fourth World states such as Rwanda, Haiti, the Democratic Republic of the Congo, and Somalia."[8] While America was pleased to see the jubilant Iraqis rejoice when the statues of Saddam Hussein fell down, liberation did not raise Iraqi's quality of life, improve the GDP, or boost their diet.

As a result of the GDP decline, it is not surprising that the country's unemployment level is very high. The estimated unemployment rate of Iraq is between 28 and 50 percent.[9] Low employment is a reason why Iraqis did not continue to be jubilant after liberation. Employment in this conservative Middle Eastern country is very important to the culture because it is a sign of a positive financial situation.

The majority of Iraqis feel that improving the unemployment rate would be more effective in lowering insurgent attacks than adding more security patrols in problem areas within the country. A survey performed by ABC News on March 15, 2004 indicated ninety-one percent of Iraqis surveyed believe that helping the unemployed find jobs would be more effective with improving security than hiring more police or increasing the security patrols.[10] This very high percentage in the survey indicates that raising employment may significantly help prevent the insurgent attacks because young unemployed men have few opportunities other than joining militias. Furthermore, when the major combat stopped in Iraq, the U.S. disbanded the Iraqi Army which increased unemployment by over half a million men and created a source of ready recruits for terrorist and criminal organizations.[11] This unemployment not only affected Iraqis quality of life negatively, but also adversely affected attempts to build a stable Iraq because men with military skills could gain employment by joining insurgent groups.

Perhaps the most profound statement of dismay came in late March 2004 when four American contractors were murdered in Fallujah. With Iraq's drastic decline in the GDP and its high unemployment rate, bringing stability is a massive endeavor that requires efficient infrastructure that brings people the needed materials and provides them with service. "Our biggest challenge right now is civil affairs. We've got to get the infrastructure up and running again."[12] This problem makes people unhappy and ready for a change. After the barbaric, shocking, and horrific attack in March 2004, Fallujah's municipal officials said "high

unemployment and continued presence of the U.S. military in and around Fallujah have made people depressed and angry. Hungry people will eat you. And people here are very hungry."[13]

To help quell unrest, Iraq's rail network can work concurrently to provide a three-fold solution to raise employment, improve the quality of life, and potentially lower the insurgency rate. But the strategic application of rail is very misunderstood and during Operation Iraqi Freedom it took over six months for the military to accept it.[14] Leaders must understand rail to use it efficiently in conjunction with truck. To help with getting the rail system back and running again in the country, the military began to mobilize one of the Army's two rail battalions but these efforts were stopped because it would increase the number of troops in the country.[15] While rail is functioning in Iraq, it has a much greater potential to stabilize the country. Leaders may see rail as an old, outdated form of transportation that commands attention but perhaps not priority.

THE VALUE OF RAIL WITH THE EFFECTIVE USE OF TRUCK IN HELPING TO BUILD A FREE AND STABLE IRAQ

Rail provides a strategic tool to maximize the flow of supplies into a country's interior through its steel wheel on steel rail low friction technology and efficient use of energy. Using low friction steel wheels, a locomotive could move itself and a tremendous amount of cargo long distances with exceptional energy efficiency.[16] This technology enabled the railroad to provide a means for transporting raw materials from a country's interior and then supply the population harvesting the raw materials. That concept still holds true today but many may see rail as an antiqued form of transport.

In Iraq, the efficiency and economy of rail is proven by an overall cost of transport that is 1/8 the cost of truck and compliments the existing modes of transport.[17] This efficiency of rail has also been seen in past wars. During the civil war, rail was estimated to be about ten times more efficient over horse and wagon power, the precursor to truck.[18] When one compares rail to truck during WWII, rail's capability was twelve times greater than the capability of trucks.[19] These facts are a significant hauling capability difference and make a strong case for using rail for the long haul of cargo and truck for the short haul pinpoint distribution. As the reader will see in the analysis portion of this paper, trucks compliment rail and provide the valuable link between the railhead and the people consuming the supplies. With rail's capability to move massive amount of supplies a long distance into a country's interior and truck's capability for short haul pinpoint distribution, collateral benefits are derived from the arrival of supplies into an area.

While sometimes difficult to quantify, the largest amount of employment that rail provides comes from its collateral benefits of bringing supplies into the country's interior. By moving huge quantities of tonnage into the country, the economy becomes stronger and the market place improves. The collateral benefits refer to the employment related to handling of supplies, selling of the material, and servicing the population with the supplies. For example, when organizations use rail to deliver construction supplies to a remote village, the supplies must be unloaded and delivered to the user, the supplies could possibly be sold in the process, and workers use the supplies to construct a building or improve a road or other project. The more tonnage delivered into the country results in more opportunities for employment. These factors are all difficult to quantify and provide data on these benefits. To help illustrate these facts, the following case studies show how these collateral benefits helped build America and the Panama Canal. By examining America's strategic application of rail, leaders can apply lessons learned to better stabilize Iraq.

STRATEGIC APPLICATION OF RAIL: TWO CASE STUDIES

James J. Hill, the creator of the Great Northern, used the strategic application of rail to create a very successful railroad that increased population centers, improved the quality of life of residents, increased employment, and maximized rail traffic. He integrated several systems together with his railroad as the focal point and Hill's strategic planning methods evolved into the techniques used in the present day rail industry. These systems were the railroad, population, raw materials harvest, and agriculture. To support this integration, Hill constructed the best railroad possible by using the highest quality steel rail possible and used the biggest locomotives to provide the greatest hauling capability. [20] For the population to increase, people needed good jobs, adequate supplies, and suitable housing. His railroad provided people with the supplies and construction materials for housing resulting in an attractive quality of life. He sold construction supplies slightly over cost to encourage settlement and provided free transportation for new residents.[21] Expanding the population along Hill's railroad ensured high traffic levels would continue, because the population needed supplies transported by rail. His railroad also opened access to raw materials such as lumber and later coal creating jobs for new residents in addition to working on his railroad.

Another opportunity for employment was farming. To help farmers along his rail line, Hill "became an authority on agriculture"[22] to maximize farmer's crop yield and while this improved farming opportunities it also ensured his railroad's success since crops are ideally suited for rail transport. Integrating the railroad with the population, raw material harvest, and successful

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agriculture, resulted in "more than 6,000,000 acres of Montana land being settled in just two years."[23] Though Hill's successful strategic application of rail, the Great Northern became one of the most successful railroads in America.

Through Hill's efforts and others like him, the rail industry of the 20th century continued to grow and build more track to access markets and transport supplies. However, in the mid century, trucks began commanding a greater market share of traffic and the use of rail began to decline. But the railroads still had a large capital investment to make in maintaining many miles of track that was being used less and less. What the railroads did to the canal barge traffic, trucks were doing to the rail industry.[24] Trucks provided convenient on time service with pinpoint delivery and were seen as a more modern and improved form of freight transport. Federal regulations also constrained the rail industry's competition with truck and helped cause the decline in the 60s and 70s because there was too much non-productive track and not enough maintenance dollars.[25] Deferred maintenance of the track became common to save money.

By the mid 1970's rail was in a very poor condition because of regulations that made it difficult to compete with truck. Many wondered if the rail industry would be able to survive. Meanwhile, the oil embargo of the early 1970s impacted truck transport and made America realize how important rail was to the nation because it provided an alternative to truck. It was at this time, the Department of Defense (DOD) realized the importance of rail in transporting military equipment and developed the Railroads for National Defense Program to identify DOD's requirements for rail and protect rail lines important to national defense that form the Strategic Rail Corridor Network.[26]

In the late 1970's, railroads began a slow recovery process through deregulation and strategic rail planning. The passage of the Staggers Act in 1980 enabled the rail industry to deregulate and it became more competitive with trucks.[27] Railroads abandoned non-productive track and the industry began to recover. James J. Hill's early planning methods evolved into a modern day strategic rail planning and contributed significantly to the recovery of rail. This concept concentrates capital maintenance dollars toward track that provides the company with the maximum revenue. The more traffic that is on a line, the more revenue it produces, and justifies spending money to maintain this track.

Norfolk Southern (NS) Corporation, which has strategic alliances with Burlington Northern Santa Fe (BNSF), successor to the Great Northern, shared their concept on strategic rail planning. "Infrastructure is the foundation of NS's business. It is costly and inflexible and if you put capacity at the wrong place at the wrong time, the company wastes money."[28] This means

that NS invests dollars into track that produces profit for the company. To help run the railroad efficiently, NS operates a core system served by branch lines, which further helps infrastructure investment. Strategic rail planning not only helped to restore rail industry but also keeps rail competitive with truck today. Railroads are no longer willing to pay entirely for the maintenance of many branch lines particularly when the traffic levels do not justify the investment. Where traffic levels do not dictate this reinvestment, customers finance the maintenance at an estimate of $10,000 per mile per year for track capable of 25 miles per hour.[29] Strategic rail planning ensures rail networks receive adequate resources and this concept would be very valuable to apply to the Iraq rail network.

Another historical example on the strategic application of rail was the construction of the Panama Canal. This example demonstrates rail's capability to serve our country's national interest, improve our country's reputation, succeed where others had failed, raise employment, and improve the population's quality of life.

The French were unsuccessful in their attempts to construct the Canal and failed to see how the strategic application of rail could be used to build it. They ended their attempts to build the Canal in the 1890's. There was a significant cost for the French failure in the form of lives, money, and their reputation. Their construction attempts cost over 22,000 lives and the equivalent of $287,000,000.[30]

Much of America's beginning efforts to build the Canal were similar to the French until June 1905 when John Stevens assumed duties as the chief engineer for constructing the Canal. "Stevens saw at once, as the French had not, that the Panama Railroad was the lifeline along which not only men, food, supplies, everything needed to sustain the work, would have to move freely and efficiently, but the Culebra dirt trains as well."[31] Stevens saw rail's capability to successfully complete the construction of the Canal by moving the massive quantities of dirt and to supply his workforce.

By using rail to construct the Canal, Stevens increased the employment of people in Panama. With only six months in the country, Stevens tripled the labor force in Panama to about 24,000 men and had about 12,000 workers alone constructing buildings.[32] These facts are a clear example of how the strategic application of rail can increase employment levels. The 12,000 workers constructing buildings improved the quality of life of workers in Panama and the railroad played a big part in transporting the building materials to the construction sites.

In addition to improving the housing, Stevens also looked into the diet of his workers and ensured they received the proper nutrition to support their work on the Canal. However, in order

for the quality of life to improve through better housing and improved diet, the existing Panama railroad needed to be upgraded.

> Within one year the line was completely overhauled and double tracked with heavier rail. [Increasing its capability]. . . The railroad fed the work force. . . The men rebuilding the railroad, those building the new towns beside the railroad, began enjoying such luxuries as fresh eggs, lettuce, dressed meats, and ice.[33]

Once Stevens upgraded the railroad, the population's quality of life improved both in housing and diet. The improvement of the workers diets was twofold, it improved the quality of the workers life and it provided energy for greater human work output.

After the quality of life of the workers improved, Stevens designed a rail network independent from the Panama railroad to move tremendous amounts of dirt to construct the Canal. He rationalized that this design was the solution to construction. He devised an elaborate "yet ingeniously elastic system of trackage within the Cut [Culebra Cut] whereby loaded trains would roll out on a downgrade and trains of empty cars would be constantly available to serve the steam shovels."[34] Using this system, Stevens was able to achieve unprecedented productivity. By January, the sustained excavation exceeded 500,000 cubic yards per month, which was twice the peak amount that the French ever achieved and in February, the sustained excavation reached 600,000.[35] The strategic application of rail proved successful in constructing the Canal and in increasing employment and improving the worker's quality of life.

CONCLUSIONS OF CASE STUDIES TO APPLY TO IRAQ

From these two case studies, there are four lessons from the strategic application of rail to apply to Iraq's rail network, which provides a foundation for recommended methods improvement to maximize rail traffic levels. First, rail gives the capability of harvesting raw materials, transporting large amounts of supplies, and accomplishing tasks never before performed. Through this capability, more people can be employed to handle the massive tonnage, harvest raw materials, construct buildings, and maintain the track. Second, rail can improve the quality of life of people by transporting massive amounts of supplies as evidenced by settling large regions of the American West and the construction of the Panama Canal. Third, strategic railroad planning help save America's rail industry and its concept could be applied to Iraq. Finally, major American railroads use a core system fed by branch lines. Iraq's core system is its main rail line into the country and trucks feed cargo a short distance into towns and cities.

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ANALYSIS OF IRAQ'S RAIL SYSTEM

RAIL SYSTEM OVERVIEW

This section provides the reader with a general overview of the Iraq Republic Railroad (IRR) for a better understanding of the rail methods of improvement. The IRR is a publicly owned and operated railroad that is about 1263 miles long and extends from the port of Um Qasr to Baghdad, then splits toward Syria and Turkey.[36] Figure 1 shows the IRR network and provides the reader with a view of the network including the stations along the line. This rail network not only links the port to the interior of Iraq but also connects Iraq's commerce with Turkey. However, there are currently two major issues with the railroad that will be discussed in this analysis. The first one is the overall maintenance condition of the line and the other is the low traffic levels of about 4-6 trains per day at a speed of about 19 miles per hour because of the lack of train tracking and control.[37]

STRATEGIC RAIL PLANNING

The use of strategic rail planning can aid in the efficient improvement of the rail system and help maximize traffic levels in the country. Bechtel used this concept to plan improvements on a vital portion of the IRR between Um Qasr and Baghdad. This concept places needed improvements on the most vital sections of heavily traveled track that are possibly in the worst condition. Using strategic planning methods used for American railroads, in order for the IRR to be economically viable, traffic levels would need to be at least 243 railcars per day. This would ensure that the estimate of about $1.2 million per year would be available from revenue for track maintenance of the IRR. The traffic levels and revenue estimate are based on the author's professional experience as senior engineer for the Railroads for National Defense Program. IRR projects a goal of 30 trains per day that equates to about 600 railcars per day, which would ensure the traffic levels exceed the viability levels.[38] Strategic rail planning also ensures that any funding for improvements is well spent and provides the maximum return on investment. The planning concept could also work to help quell unrest by directing improvements to troubled areas in an effort to ensure these areas receive adequate supplies. Conversely, coalition
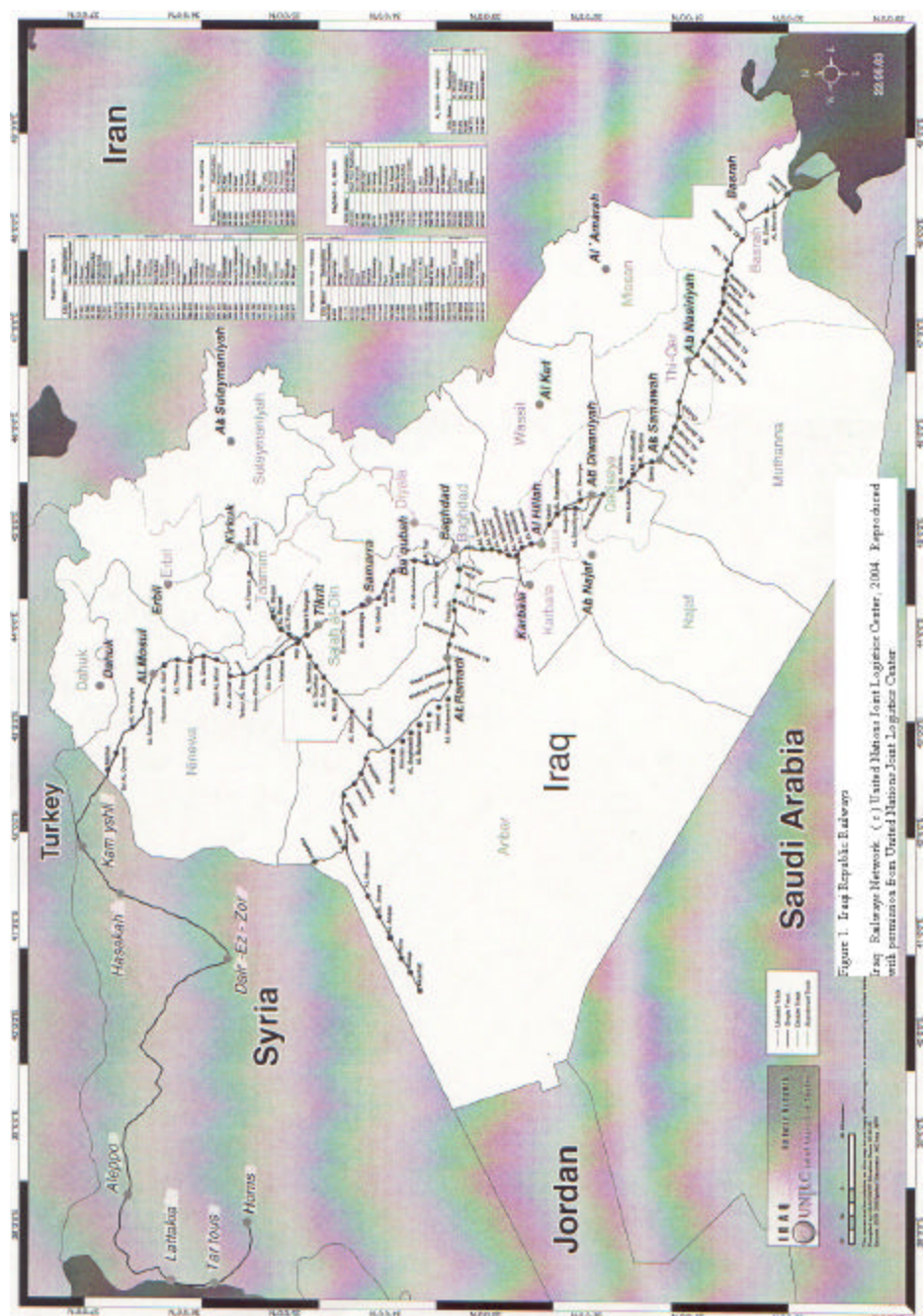
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Figure 1. Iraq Republic Railways

Iraq Railways Network. (c) United Nations Joint Logistics Center, 2004. Reproduced with permission from United Nations Joint Logistics Center

FIGURE 1

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leadership can use a carrot and stick type negotiation tool and slow down, stop, or change supply composition to quell the unrest.

IRR MANAGEMENT

Iraqis need assistance in maximizing rail traffic and the U.S. can help them improve the management of the system. By developing partnerships between the IRR and American railroads, the management of the IRR will improve. For example, the U.S. Trade and Development Agency (USTDA) hosted an event to bring over 75 U.S. business representatives together to help Iraqis build a more efficient railroad using an allocated 210 million dollars for IRR reconstruction.[39] Through this meeting Iraqis met key personnel in the U.S. who could help them with technical problems and gain advice on improving management of the IRR. It is partnerships with the USTDA that make the IRR stronger. The meeting with USTDA, however, could be carried further with a mentorship program with large American railroads.

To help improve IRR management, Iraqi railroad managers and engineers could be paired with a primary and secondary mentor from a large American railroad to advise, train, and share industry knowledge. Large private railroads in the U.S. are the experts in running railroads efficiently because they must do so to make a profit and stay in business. Coupled with this mentorship concept is the idea of reach back capability. Reach back capability builds on a Corps of Engineer idea where field elements can be in a remote site and use satellite technology to link into their design engineering sections. The engineers design the required structure from thousands of miles away with input from the field element. It allows talented engineers to design work and not expose themselves to a hostile environment. This concept combined with custom manufacturing could also assist in producing repair parts or finding them to repair more of the IRR rolling stock or track network.

To further improve management, USTDA is also assisting the IRR with improving maintenance of their rolling stock. At one point the IRR had 50 locomotives, but only 35 were in operation.[40] Preventative maintenance and better security will help raise the maintenance status of the rolling stock. Through effective mentorship, the IRR will improve its management.

ECONOMICAL TRAIN TRACKING

New technology can help in train tracking on the IRR. Figure 2 shows the BNSF Network Operations Center (NOC) in Fort Worth Texas and is an example of a train tracking system. This NOC controls trains on the BNSF network. It is well staffed, uses the best technology available, and was expensive to build and operate. After major combat ended, looters severely damaged the IRR's centralize train control dispatch center in KirKut. Based on analysis of this

sub-system, the tracking of trains is the weak link in the railroad. The IRR will receive a world-class tracking and communication system designed by Volpe Transportation Center, but it is not available yet. From the author's experience through work with the Federal Railroad Administration, Volpe's project development time can be as much as two years.

To help correct this, a method for establishing a NOC with a small amount of investment is available now. The Surface Deployment and Distribution Command Transportation Engineering Agency developed the "Intelligent Road/Rail Information Server (IRRIS) that aids worldwide rapid deployment capability by providing movement decision-makers with the best tool for infrastructure readiness and surface shipment tracking worldwide."[41] Using computers connected to the Internet, Iraqis can access IRRIS and track the trains operating on the system. Each train would require a transponder costing between $500 and $ 1500.[42] This transponder sends a signal to geographical positioning satellites that IRRIS feeds into to track the train and provides a real time geographic position of its location.

Terminal operators monitor the location of trains for safety and efficiency. If a train gets too close to another or if a train stops because of an insurgent attack or track damage, the terminal operator observes this using IRRIS and calls the trains in his area to slow them down or stop them until the problem is solved. Using this system, more trains can be transported on the line and that provides more supplies to areas in need. It would be a fraction of the cost of the typical NOC of a large U.S. railroad. By using IRRIS, employment rates and Iraqis' quality of life will increase. IRRIS will enable the IRR to transport a tremendous amount of cargo in the interim until the Volpe system is up and running and can also function as a back up system in the event the Volpe system goes down.

Figure 2. BNSF Network Operations Center

Network Operations Center, James J. Hill Center, Fort Worth, TX . www.bnsf.com
Reproduced with permission from Burlington Northern Santa Fe Railway.

FIGURE 2

SECURITY

The IRRIS system can also help to secure the railroad. In America, highway departments use web cams to monitor the traffic flow on their major highways and report to motorists the traffic situation. By using IRRIS, an operator can access these real time feeds, and determine the status of highways. Using railroad web cams, the railroad can be monitored and observed. After linking to IRRIS, Iraqi terminal operators could monitor any improper activity on the railroad. If the terminal operator notices suspicious activity he would report the activity to security forces. Each terminal would need a computer that can access the Internet and have an operator. Terminals would require to be manned on a 24/7 basis. This employs more Iraqis and gives them responsibility for securing the railroad in their region.

Leaders may regard the railroad difficult to secure and slow to repair if an attack disables it. IRRIS will help secure the line better, but if an attack does disable the line there is a quick method of repair. The concept is to cut the rail section out and replace it with a prefabricated panel of track that is carried on a railcar along with a crane to install it. In America, this concept has worked effectively to get the track back in service within hours.

RAILHEADS

The construction of railheads and their use maximizes transportation of materials into the country's interior, improves employment, and works to raise Iraqis' quality of life. The railroad should be used to transport cargo for the long haul and then trucks transport supplies a short distance for pinpoint distribution. Rail crews uncouple railcars at the spur and local crews move the railcars with large highway/rail (HiRail) 2½-ton trucks to the railhead. The HiRail truck travels on the rail line and acts as a small locomotive to spot one or two railcars at railhead unloading areas. Once at the railhead, people from the town unload the railcar using material handling equipment (MHE) to load containers on smaller transfer trucks to deliver the cargo to people within the town.

The HiRail movement of the railcar, operation of the ramp, MHE, and transfer trucks should come under the responsibility of the city manager. This concept not only provides the efficient distribution of material, but also employs area personnel who have a vested interest in getting the material to the appropriate people within the town. Table 1 provides an estimate of the number of personnel to operate a railhead and these figures are based on the author's professional experience. Figure 1 shows a total of 106 stations on the IRR. Using the total number of stations and the total estimated railhead work force from table 1, the potential employment is about 11,236 people. Strategic rail planning should be used to prioritize the

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placement of these railheads based on need, population density, and dispersion. These factors will ensure that if a railhead is constructed, it will be used to benefit the people.

Estimated Rail Head Work Force

Duty assignment	Per shift	Total
Security personnel	8	24
Truck/Rail Crew	3	6
Container handler	4	8
General labor	10	20
Truck drivers	8	16
Distribution workers	16	32
	Total	106

TABLE 1

PREVENTATIVE MAINTENANCE

Much of Iraq's network is in poor condition because of deferred maintenance and neglect. Bechtel Corporation, a major reconstruction company, is upgrading about 45 miles of track between Um Qasr and Shaimba Junction and estimates about ½ of the entire network requires upgrade because of deferred maintenance.[43] The purpose of the project is to improve freight transport service from the port to the rest of the country. To repair this track, a rough estimate would be about 55 million dollars excluding security costs.[44]

A preventative maintenance program should be implemented using Iraqi labor to employ more Iraqis and improve the track to transport more tonnage to the people. Iraqis fix the track when it is broken. Bechtel is working to implement preventive maintenance by training Iraqis. Some tasks that need to be performed are track inspection, tie maintenance, and general maintenance. Track inspectors would visually inspect the line daily and annotate and report problem areas. They would also perform minor maintenance fixes such as replacing joint bolts. Tie gangs would replace old ties and realign the track to ensure its efficient and safe operation. General maintenance workers would ensure the line is free of debris, water drainage structures are functioning, and any build up of sand on the track is removed. Additionally, they would lubricate switches and make sure that they are operating correctly.

To show how the IRR can be used to employ Iraqis, table 2 shows the number of employees for major railroads in America and IRR. It also provides a ratio of miles of track

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owned and operated to number of employees. Major U.S. railroads operate privately for profit and have an average ratio of 1.45. The IRR is a public railway and has a ratio of 9.50. The higher ratio means the IRR employs more people per mile of track than U.S. counterparts. The high number of IRR employees supports the concept of using the railroad to employ more Iraqis.

Railroad Employment Statistics

Railroad	Miles of track	Employees	Ratio
Union Pacific[45]	32832	48000	1.46
Norfolk Southern[46]	21500	28471	1.32
CSXT[47]	23000	41000	1.78
Burlington Northern Santa Fe[48]	30000	36000	1.20
IRR[49]	1263	12000	9.50

TABLE 2

CONCLUSIONS

To maximize rail transportation levels several methods of improvement could help improve capabilities and these improvements form the foundation for conclusions of this paper. Iraq's railroad is functioning but it has greater capability to build a free and stable country, if leaders recognize its strategic value. Strategic rail planning can help to maximize traffic on Iraq's railroad by using funding wisely and assist in quelling unrest. Modern technology can help safely track trains and assist in securing the railroad from insurgents. The implementation of a rail preventative maintenance program can help maximize traffic levels, employ Iraqis, and improve their quality of life. The construction of railheads and use of them can maximize the distribution of supplies, improve employment, and raise the quality of life of Iraqis.

RECOMMENDATIONS

In order to maximize transportation levels, leaders should emphasize the importance of rail and implement the following methods of improvement:

- Use strategic rail planning to identify the best locations for improvements based on high traffic usage and to identify areas where projects could help to quell unrest by putting massive amounts of logistics into the area.
- Implement IRRIS as a train tracking system to increase the capability to transport a greater amount of tonnage on the line. IRRIS is available now and should be used

instead of waiting for the Volpe system. Evaluate the use of IRRIS to provide security to the rail line and protect it from attacks.

- Implement a mentorship program between American railroads and members of the IRR to help manage the railway better and continue to train Iraqis on rail preventative maintenance procedures to not only improve the condition of the line but also to employ more Iraqis.
- Program construction of railheads, adequately equip them, and use Iraqi labor where possible to construct these facilities and operate them.

Implementing these recommendations will provide a three-fold improvement to a free and stable Iraq by raising the employment, increasing the Iraqi quality of life, and potentially lowering the insurgent rate. Strategic application of rail has far reaching positive effects within a country and the wise strategic leader recognizes its value and employs it.

WORD COUNT = 5983

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